Aviation Tasks

Task Risk Assessment

for

NSW Department of Primary Industries

Emergency Management Unit
Biosecurity and Food Safety

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Section 1 – Introduction

NSW Department of Primary Industries (NSW DPI) Emergency Management aviation operations are potentially hazardous activities that can impact on the safety of response personnel and the community, and the reputation of NSW DPI if not conducted in accordance with the applicable rules, regulations, and considerations. This Task Risk Assessment supports the following NSW DPI aviation tasks:

- aerial surveillance
- aerial spotting in support of locust spraying
- aerial spraying in support of locust control
- aerial shooting
- aerial mustering
- aerial transport
- aerial sling loading by helicopter.

In discharging its obligations under the Work Health and Safety (WHS) Act for activities conducted, NSW DPI is committed to using risk management processes. This Risk Assessment has been conducted following the details in 'NSW DPI Aviation Management Document – CONOPS'. Refer to the task risk assessment for unmanned aerial systems for risks associated with UAVs.

A company that is either under contract, or regarded as a preferred supplier, is referred to as 'contractor' in this document. A 'contract' refers to the life of an established contract, Standing Offer or the expected period between NSW Rural Fire Service (RFS) Aviation Section and NSW DPI sponsored reviews of an operation.

Risks are categorised into seven (7) elements, which may have a number of sub-elements.

A. Contractor competency
B. Crew competency
C. Flight preparation
D. Aircraft preparation
E. Pre-flight discussion
F. Flight operations
G. Accident considerations

Section 2 - Risk assessment

A. Contractor Competency:

The competency of the Contractor is fundamental to safe and efficient aircraft operations. The risk controls are to ensure that the Contractor has suitable culture, systems, processes and procedures to provide NSW DPI some confidence that the Contractor is approaching the task appropriately and to minimise the NSW DPI risk exposure. The proposed controls are intended to address the requirements for a safety management system (SMS), Contractor accident history, reporting, and senior Contractor management roles.

The proposed controls identified and additional requirements in the Standing Offer requirements to include Contractors to have an effective SMS and more comprehensive auditing and assessing requirements. This also includes a historical review of the Contractor's operations and culture including a review of previous CASA audit reports.

Aerial surveillance, spotting in support of spraying, shooting, transport (including underslung loads) represents a potential safety risk to NSW DPI and the Contractor as the operation requires NSW DPI and Contractor personnel, landowners/managers and members of the public being airborne in aircraft at low levels, particularly during landing and take-off, and during the hook-up and drop-off for slinging activities, to achieve the task.

Aerial spraying and mustering represent a lower safety risk to NSW DPI when compared to the Contractor as the operation does not involve NSW DPI personnel being airborne in the aircraft and therefore the safety risk exposure is primarily on the Contractor. NSW DPI still is exposed, as there will be impacts on reputation and image and organisational capability. The community and/or environment could be exposed due to incorrect chemical spreading.

A. CONTRACTOR COMPETENCY		1. Contractor Factors							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Lack of Contractor competency leads to unsafe practices, inefficient and/or illegal operations	1. **Contractor** checked by RFS Aviation Section to ensure that it has an Air Operating Certificate endorsed for aerial work and charter operations. Endorsed for mustering where task requires. 2. **Contractor** audited /assessed within the Standing Offer period, by a competent company or authority on behalf RFS Aviation Section, as being suitable to conduct aerial operations. 3. RFS Aviation Section contracting requires the **Contractor** to demonstrate that it has effective safety and quality management systems structured to the size & function of the Contractor. 4. **Contractor** has been assessed by the RFS Aviation Section to ascertain that it has not had an accident attributable to maintenance or operational management in the previous 5 years or if it has, it can demonstrate that suitable actions have been taken to address identified deficiencies. 5. RFS Aviation Section requires the Contractor to report all occurrences (including non- RFS Aviation Section incidents) as part of the performance management of the contract. 6. RFS Aviation Section assesses **Contractor's** commitment to safety and operations by examining its' investment in the company safety and operational management systems and equipment/personnel. 7. **Contractor** assessed by RFS Aviation Section that its senior management staff can demonstrate competent management of low-level flight training, operations, and safety. 8. RFS Aviation Section reviews and actions as part of the auditing/assessing process the Contractor's and senior management history, operational and SMS. 9. RFS Aviation Section investigates any occurrences while performing NSW DPI tasks to ascertain Contractor management / competency. 10. RFS Aviation Section reviews prior CASA audits to establish any non-compliances /conformances that may impact aircraft safety/performance.	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10**	ATSB has identified issues in the past with company culture and poor management contributing to accident causation. Historical data shows that organisational failure has been a contributor to accidents on 5 known occasions in the last 5 years indicating likelihood as *Almost certain*. Due to the multiple current controls to ensure the Contractor is competent to conduct low level aircraft operations, assess the likelihood as ***Rare***	Consequence of an accident can be catastrophic due to potential for loss of life. Assessed as ***Catastrophic*** Where no NSW DPI personnel being involved (e.g. spraying/mustering) , assessed as ***Major*** to NSW DPI based on economic loss and impact on reputation and image. Also assessed as ***Major*** For impact of incorrect spreading of chemical.	**Medium**	All considered controls implemented and will continue to be monitored	***Rare***	If management controls fail, then the consequence of an accident may be fatal therefore assessed as ***Catastrophic*** Where no NSW DPI personnel involved, assessed as ***Major*** to NSW DPI based on economic loss and image and for impact of incorrect spreading of spray chemical	**Medium** **Note:** All controls to be implemented and checked through Standing Offer requirements and audit processes

B. Crew Competency:

The role of the pilot in decision-making, attitude and approach to safety is paramount to safe, efficient, and environmentally aware NSW DPI operations. The proposed controls include a review the pilot's history and training as well as emphasising the role of an effective SMS, and a more comprehensive auditing and assessment protocols in checking the competence of the pilot and of the company's oversight of the pilot. Poor decision making by pilots has been identified in many accidents in all aircraft types. Although a difficult aspect to measure, controls are required to assure as far as possible that proper decision-making is conducted and poor decisions do not impact on aircraft, its' occupants or community safety.

The other persons on board that have important roles to play in the safe operation of the aircraft are classified as task aerial work task specialists. Their role includes noting excursions from planned flight, highlighting warning and caution indications, operation of the equipment and acting as a member of a multi-crew environment. Consequently, they should be trained, qualified and authorised to operate in their role in the aircraft by the contractor. Those persons on board who are essential for the task but have no role to play in the safe operation of the aircraft are classified as aerial work passengers.

All persons on board should receive individual briefings each time they fly to reflect their role within the aircraft even if they are only a passenger.

HUET is required in operations where tasks are conducted over extensive water bodies.

Mustering: The pilot is the sole occupant during this task therefore the risk is confined to them and not a NSW DPI employee or aerial work passenger. The greatest risks faced by the pilot as regards decision-making and experience are the handling of the helicopter to avoid (in the piston engine case) low rotor RPM stall events and ensuring adequate power margins.

Spraying: Proper chemical handling and spreading are important to community safety, environmental protection, and therefore there needs to be systems in place to ensure that chemicals are utilised correctly.

The greatest risks faced by the crew as regards pilot decision-making and experience are the handling of the aircraft, ensuring adequate power margins and poor appreciation of structures and lines (wires, power etc).

B.	CREW COMPETENCY	1.	Pilot Aspects						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Lack of pilot proficiency / experience leads to poor decision making and/or flying ability resulting in an accident	1. **Pilot** is properly licenced to conduct required aerial work operations by CASA. 2. **Pilot** has sufficient experience to properly assess conditions and requirement and to conduct required operations. Experience as detailed in Standing Offer. 3. **Pilot** has had no accidents involving poor decision-making or mishandling of the aircraft in the previous 5 years or 1000 flight hours unless adequate rectification and supervision demonstrated. 4. **Pilot** has undergone 'fly the wire' or similar aviation safety courses. 5. **Pilot** has undergone any aircraft-specific safety courses if available. 6. **RFS Aviation Section** conducts audit/assessment to assure pilot has appropriate experience and qualifications to conduct the task. 7. **Contractor** has a robust training and checking system to ensure aircraft is handled properly, proper decision-making encouraged. 8. **Contractor** is checked by **RFS Aviation Section** to have a functioning, effective and appropriate SMS in operation**.** 9. **Contractor** has fatigue management policies to provide support to pilots to avoid fatigue lessening the chances of poor decision-making. 10. **Contractor** has fatigue management policies for ground handling personnel to help ensure proper handling of the aircraft. 11. **Contractor** has functioning, effective drug and alcohol management policies and procedures in place for pilots and ground crew. 12. **Contractor** has a detailed manual that provides the appropriate information on such things as operations in turbulence, wind and heat and has stipulated power margins and control recovery guidance.	**1** **2** **3** **4** **5** **6** **7** **8** **9** **11** **12**	With the controls imposed, there should be some reduction from Almost Certain to ***Unlikely***	Consequence of poor pilot decision making is, as regards safety, often fatal and therefore considered ***Catastrophic***	**High**	**10**	Other than removing the human from the consideration, it is almost impossible to eliminate poor decision making by pilots, but the extra defences identified should lower the likelihood or at least identify those who may be prone to making poor decisions. ***Unlikely***	Consequence to pilot, crew and passenger safety is likely to be ***Catastrophic***	**High** **Note:** All proposed controls to be implemented through Standing Offer requirements and audit processes **Medium** Where no NSW DPI personnel being involved (e.g. spraying/mustering), or during transport not involving slinging

B.	CREW COMPETENCY	2.	Crew Aspects						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Lack of crew proficiency / experience leads to poor decision making resulting in an accident	**1**. **Crew** has sufficient experience to properly assess conditions. **2. Crew** member has had no accidents involving poor decision-making in the previous 5 years or 1,000 flight hours unless adequate rectification and supervision demonstrated. **3**. **Crew** has undergone DPI endorsed 'Crew Resource Management', 'Work Safely Around Aircraft' and similar aviation safety courses e.g., Fly the Wire). **4**. **NSW DPI** conducts audit/assessment to assure its crew has appropriate experience suitable to the task. **5**. **NSW DPI** has fatigue management policies to provide support to its crew to avoid fatigue lessening the chances of poor decision-making. **6**. **NSW DPI** has functioning, effective drug and alcohol management policies and procedures in place for its crew.	**1** **2** **3** **4** **5** **6**	Poor crew decision-making has been identified in several industry accidents in the past few years. With the controls imposed, there should be a reduction to **Unlikely**	Consequence of poor crew decision making is, as in regards safety, often fatal and therefore considered **Catastrophic**	**High**	No further controls are considered to be required based on the current risk profile	Other than removing the human from the consideration, it is almost impossible to eliminate poor decision making by crew, but the extra defences identified should lower the likelihood or at least identify those who may be prone to making poor decisions. **Unlikely**	Consequence to pilot and crew safety is likely to be **Catastrophic**	**High** Note: All proposed controls to be implemented through Standing Offer requirements and audit processes. **Medium** Where NSW DPI personnel being involved in transport not involving slinging **Nil** Where no NSW DPI personnel being involved (e.g. spraying/mustering)

C. Flight Preparation Aspects:

PPE (personal protective equipment) is an important final control in reducing the severity of an accident. PPE should provide protection against ambient conditions (e.g. noise), impact and fire. The current controls appear sufficient to ensure that effective PPE is in place. Incorrect PPE for aircraft can affect communications and impact on hazard identification.

Environmental considerations such as noise should be addressed through wearing correct PPE.

Minimum of bare skin to be exposed, gloves, sturdy leather footwear shall be worn. Helmet with visor(s) should be worn in helicopters.

Preference for Nomex-type flying suits for aircrew in helicopters.

C.	**FLIGHT PREPARATION**	1.	**PPE**						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Not wearing or having available appropriate PPE leads to a compromise in safety for pilot, crew and passengers exposing them to environmental, and impact hazards	**1.** **Standing Offer** specifies PPE requirements for helicopter operations. **2.** **NSW DPI** procedures require the wearing of correct PPE (as listed in relevant Task Profile). **3.** **Contractor** has been audited/assessed within the Standing Offer period by a competent company or authority to ensure compliance and conformance with regulations, Standing Offer, NSW DPI procedures and industry practice **4.** **Contractor** has procedures that requires all personnel on-board an aircraft to wear the appropriate PPE and where required, the PPE is compatible with aircraft communication / intercom equipment **5.** **Contractor** issues appropriate PPE to its crews 6. **RFS Aviation Section** checks that **Contractor** has procedures to ensure its crews wear appropriate PPE for Department operations	**1** **2** **3** **4** **5** **6**	Lack of appropriate PPE has been identified in accidents. ***Unlikely***	Lack of appropriate PPE has been identified, as a reason for causing greater injury than would otherwise be expected. Due to the required PPE, consequence assessed as ***Moderate***	**Medium**	No further controls considered necessary			**Medium**

D. Aircraft Preparation Aspects:

The proposed and current controls review the maintenance organisation's procedures, culture and standards. Historical information is also sought to establish prior practices. SMS for maintenance organisations will be relatively new and therefore the requirement may require relaxing for some time to allow a maintenance organisation to work towards developing a suitable system.

A mechanical failure can be critical due to height to fall or impact with obstacles/ground. Therefore, mechanical reliability and maintenance are essential in reducing the risk.

Expressions of Interest / Requests for Tenders and ultimately contracts should stipulate the requirements for demonstrably effective SMSs and Maintenance Procedures Manuals. The Australian agricultural and mustering industry has experienced high accident rates and therefore any Contractor intending to work for NSW DPI must display the appropriate culture and management systems.

Fuelling standards are important to safe operations and can receive little review despite its importance. The proposed controls are focused on the organisation having the proper procedures in place to ensure the quality of fuel delivered to the aircraft.

An engine failure due to poor fuel could be critical especially at low height.

Several standards exist to ensure the proper quality of fuel is delivered. Aircraft also have filters to ensure as much as possible the proper quality of fuel is delivered to the engine.

D.	AIRCRAFT PREPARATION	1.	Maintenance						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Improper maintenance leads to mechanical failure of critical system(s) such as tail rotor, main rotor, controls, or engine.	1. **Contractor** and **Maintenance Organisation** have a functional and appropriate safety and quality management system that includes risk management, reporting, training, and accountabilities. 2. **Maintenance Organisation** has appropriate CASA approvals. 3. **Contractor** and **Maintenance Organisation** have a trend recording system to detect potential failures in systems before they actually occur. (Although a possible control, trend recording of parts in the agriculture industry is considered impractical at this stage), 4. **Maintenance Organisation** has an appropriate management culture that continually assesses the company and its operating procedures for continual improvement. 5. **Contractor** charges appropriate charter rates to ensure company has sufficient resources to properly maintain aircraft including replacement of components. 6. **Maintenance Organisation** has an effective maintenance procedure/quality manual and complies with that manual. 7. **Contractor and Maintenance Organisation** regularly audited and assessed to ensure compliance with regulations and good maintenance practices. 8. **Maintenance Organisation** is checked to ensure that only approved parts are likely to be used on the aircraft. 9. **Maintenance Organisation** is checked to ensure the major maintenance is conducted in controlled environmental conditions i.e., clean conditions. 10. **Maintenance Organisation** 5-year history is reviewed for prior inappropriate maintenance standards. Review should include review of CASA audits and the Standing Offer should reflect the requirement for prior audits to be available for review.	**1** **2** **4** **6** **7** **8**	ATSB historical data indicates that the industry has several instances of maintenance failure in aircraft leading to accidents indicating that the likelihood is *Almost Certain*. It is considered that with the current controls, the likelihood will be ***Possible***	ATSB historical data indicates that the instances of maintenance failure leading to accidents were non-fatal although on at least 3 occasions, the aircraft suffered significant damage. The consequence is therefore assessed as ***Major***	**High**	**5** (to help assure parts replacement and overhaul) **9** (major maintenance including engine removal shall be done within the hangar environment – contract/Standing Offer requirement) **10** (to assist in reviewing organisation culture and prior work) **Note:** Not all proposed controls implemented – see 3.	***Unlikely***	***Major***	**Medium** **Note:** All proposed controls except #3 to be implemented through the Standing Offer requirements and auditing processes.

		2.	Fuelling						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
a. Incorrect fuel used to fuel the aircraft leading to engine failure and aircraft forced landing b. Poor quality fuel is used to fuel the aircraft leading to engine failure and aircraft forced landing c. Incorrect procedures used that create a hazard during refuelling that could lead to injury, death or damage to aircraft or facilities.	1. **Contractor** and **Maintenance/Fuel Supply Organisation** have operating SMSs that include risk management, reporting, training and accountabilities. 2. **Contractor** and **Maintenance/Fuel Supply Organisation** have correct procedures for the storage, security, testing and dispensing of fuel. 3. **Contractor** and **Maintenance /Fuel Supply Organisation** have appropriate management cultures that continually audit and assess the operating procedures and practices for conformance and continual improvement including ensuring conformance with fuel industry standards (consider ASTM, JIG). 4. **Contractor** and **Maintenance Organisation** keep proper records of fuel uplift and aircraft filter replacements to identify potential poor sources of fuel. 5. **Contractor** and **Maintenance/Fuel Supply Organisation** have effective maintenance and fuel supply procedure/quality manual and complies with the manual. 6. **Contractor** and **Maintenance /Fuel Supply Organisation** checked to ensure that proper testing of fuel is conducted, and records kept. 7. **Contractor** has procedures that direct pilots to ensure correct type of fuel is used and to assure the quality of fuel. 8. **Aircraft** equipped with suitable filters and mechanisms for early detection of poor quality fuel.	**1** **2** **3** **4** **5** **6** **7** **8**	There have been few accidents attributed to poor quality fuel according to ATSB data although report from maintenance organisations indicate that the last line of defence (aircraft systems) has been catching issues associated with fuel indicating that the likelihood is ***Rare***	An engine failure or dual engine failure as a result of poor quality or incorrect fuel would likely lead to loss of aircraft with associated crew fatalities and therefore would be ***Catastrophic***	**Medium**	All considered controls implemented	***Rare***	An engine failure or dual engine failure as a result of poor quality or incorrect fuel would likely lead to loss of aircraft with associated fatalities and therefore would be ***Catastrophic***	**Medium** **Note:** All controls to be implemented and checked through Standing Offer requirements and audit processes

		3.	Chemical Handling						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Incorrect chemical loading poses hazard to personnel, local community or resources.	1. **Contractor** has operating SMS that includes risk management, reporting, training, and accountabilities. 2. **Contractor** has correct procedures for the storage, transport, dispensing and disposal of chemicals. 3. **Contractor** is licenced to store, transport and dispense chemicals. 4. **Contractor** has appropriate management culture that continually audits and assesses the operating procedures and practices for conformance and continual improvement including conformance with agricultural industry standards. Includes training, checking that procedures are being followed, and recording / investigating incidents related to poor chemical handling. 5. **Contractor** keeps proper records of chemical uplift, use and disposal. 6. **NSW DPI** checks that the **Contractor** has correct equipment for transport, storage and dispensing of chemical. 7. **Contractor** has effective maintenance and calibration of chemical supply equipment which is compliant with procedures / manuals 8. **NSW DPI** checks that **Aircraft** equipped with suitable equipment and mechanisms for the holding and dispensing of chemical. 9. **NSW DPI** checks **Contractor** history for no occurrences associated with handling chemicals in the previous 5 years.	**1** **3** **5**	There have been no accidents attributed to chemical dispensing problems according to ATSB data. There are few existing controls for the management of chemicals and much has been left to the operator. Therefore, under present controls, likelihood is ***Possible***	The failure to handle chemical correctly could lead to local health or environmental effects of short duration – could also present DPI with public perception problems. The consequence is therefore assessed as ***Moderate***	**Medium**	**2** (to assure correct procedures exist) **4** (to assure management oversight and 'buy in' on safe & proper handling of chemicals) **6** (to assure the equipment is correct) **7** (to assure there are manuals for maintenance and calibration of equipment) **8** (to assure proper equipment, maintenance and use) **9** (to assure there is no culture of incorrect chemical use)	With the further controls in place, the likelihood of improper chemical handling is considered ***Rare***	The failure to handle chemical correctly could lead to local health or environmental effects of short duration ***Moderate***	**Low** **Note:** All controls to be implemented and checked through Standing Offer requirements and audit processes.

		4. Firearm Handling							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Incorrect firearm handling poses hazard to helicopter, crew members, and/or people on the ground.	1. **Contractor** has operating SMS that includes risk management, reporting, training, and accountabilities. 2. **Contractor** has correct procedures for the storage and use of firearm(s). 3. **Shooter** is licenced, authorised, and sufficiently experienced to operate firearms. 4. **Contractor** has appropriate management culture that continually audits and assesses the operating procedures and practices for conformance and continual improvement including conformance with appropriate industry standards. Includes training, checking that procedures are being followed, and recording / investigating incidents related to poor weapon handling. 5. **FAAST rep** checks that the **Contractor** has correct equipment for carriage and use of firearms. 6. **FAAST rep** checks that **Aircraft** design is suitable as a shooting platform. 7. **FAAST rep** checks **Contractor** history for no occurrences associated with firearm handling in the previous 5 years.	**1** **2** **3** **4** **5** **6**	There have been no accidents attributed to firearm handling according to ATSB data. Therefore, under present controls, likelihood is considered ***Rare***	The failure to handle the firearm(s) correctly could lead to injury or death of the shooter or others within and outside the helicopter. The consequence is therefore assessed as ***Catastrophic***	**Medium**	**7** (to assure there is a culture of correct firearm use)	With the further controls in place, assess the likelihood of improper firearm handling being delivered is considered ***Rare***	The failure to handle the firearm(s) correctly could lead to injury or death of the shooter or others within and outside the helicopter. The consequence is therefore assessed as ***Catastrophic***	**Medium** **Note:** All controls to be implemented and checked through Standing Offer requirements and audit processes.

E. Pre-flight discussion:

Poor planning has been cited in many occurrences, but the current controls appear to be adequate in minimising the risks associated with poor planning.

Contractors should demonstrate that it has the systems, practices, procedures, and management oversight in place to ensure flights are well-planned.

E.	**PRE-FLIGHT PLANNING**								
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Inadequate planning information leads to task failure, aircraft being out of limits, inadequate fuel, weather-related problems and thereby placing the task or aircraft at risk of an accident. Poor planning of operations may place people in danger. Poor planning may add additional unnecessary cost.	1. **LAOM** conducts pre-flight briefing and provides written details and planning material to help assure pilot fully understands requirements and to achieve task outcomes, safely and efficiently. 2. **LAOM/SAM** coordinates with **Contractor** and **other organisations as required** to assure proper location and support of operations. 3. **Contractor** provides pilot with sufficient planning material and access to information to ensure the flight can be conducted safely while achieving the task objectives. 4. **Contractor** provides guidance within operational documentation to pilots on the required pre-flight planning activities including any NSW DPI required procedures. 5. **RFS Aviation Section** details requirement in Standing Offer for proper planning including hazard identification to be included in Contractor's documentation. 6. **RFS Aviation Section** audits and assesses the Contractor to ensure that the required processes and procedures are in place. 7. **Contractor** has an operating SMS that includes risk management, reporting, training, and accountabilities. 8. **Contractor** ensures adequate communications are in place to ensure proper briefing material is available. 9. **Contractor** has a strong fuel reserve and planning policy and associated procedures. 10. **Contractor** has a strong oversight policy and practice to ensure pilots are conforming to company requirements.	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10**	Poor planning can include the failure to survey for wires, ensuring sufficient power margin and not accounting for wind correctly. As a result, there have been 3 accidents in the past 5 years attributed to poor quality planning according to ATSB data indicating that the likelihood is *Likely* However due to the controls identified, lowers the likelihood to ***Rare***	Poor planning can result in the aircraft running out of fuel or striking a wire or other obstruction or other aircraft resulting in fatalities. The consequence is therefore assessed as ***Catastrophic***	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium**

F. Flight Operations:
1. Start: Current auditing and assessing protocols should adequately address the controls. Pre-flight inspections and system checks are important to ensuring an aircraft is ready to fly.
2. Navigation: Current auditing and assessing protocols should adequately address the controls. The likelihood of poor navigation issues even in remote areas has been significantly reduced by the use of GPS.
3. Fatigue: The control requiring an SMS will assist in detecting fatigue and addressing causes before fatigue leads to an accident. Inattention and fatigue can only be controlled through administrative measures. The Contractor must ensure that the pilot is fully ready for operations especially when operating low level and the pilot must be encouraged to take a break if feeling fatigued or tired when operating low level.
4. Ground impact: Inadvertent ground impact most likely the result of inattention or mishandling of the aircraft.
5. Wire and obstacle strike: Operations at low level are significantly impacted by the chances of wire strike. Any operations below 500ft AO are regarded as low flying and therefore pose the highest risk. Current procedures require pilots to climb to at least 500ft between any low flying areas. Standard high tension power line structures are up to 55m (180ft) excluding heights of the hills they may be erected on. The operation of the aircraft at low levels with the present administrative controls is assessed as a high risk. Risk is lowered to medium if the aircraft operating height is raised to above likely obstacle height. Consideration should also be made to use helicopters that have demonstrated good crashworthiness capability and occupied seats should have 4 point harnesses (rather than lap belts) which would lower the risk to medium.
6 & 7. In-flight emergency & collision: Knowledge, practice, and assessment currency are required to ensure that a pilot is able to handle most emergencies properly. Procedures should be clearly laid down in aircraft and company documentation.
8. Power margin: For piston engine helicopters specific reference and training should be made to rotor stall conditions, entry, and recovery.
9. Landing
10. Fixed wing transport
11. Helicopter transport

F.	**FLIGHT OPERATIONS**	**1.**	**Start**						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Incorrect pre-flight, system checks or role equipment checks leads to compromise in safety	1. **Contractor** has checklists that conform to the Original Equipment Manufacturer publications. 2. **Contractor** conducts training and checking to assure pilot conduct checks. 3. **RFS Aviation Section** conducts audit/assessment to assure **Contractor** has a robust training and checking, and SMSs, (including requirement for checks to be conducted in adequate lighting).	**1** **2** **3**	ATSB reports have not indicated poor pre-flight or starting procedures as a contributor to occurrences in the past 15 years. Assessed as ***Rare***	Incorrect pre-flight checks could lead to aircraft failure in flight leading to fatalities and is therefore rated as ***Catastrophic***	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium**
		2.	**Navigation**						
Poor navigation leads to helicopter arriving late, not arriving at correct location or not doing the required task	1. **Contractor** has training and checking to assure crew can map-read and use navigation equipment. 2. **RFS Aviation Section** requires GPS installed (Standing Offer). 3. **Contractor** provides GPS equipment in helicopter. 4. **NSW DPI** has published procedures that ensure correct information is briefed to crews before their departure.	**1** **2** **3** **4**	No significant occurrences recorded related to aircraft becoming lost. Assessed as ***Rare***	Consequence of crew poor navigation in a helicopter is considered ***Minor*** provided the pilot decision making is sound	**Negligible**	No further controls are considered to be required based on the current risk profile			**Negligible**

		3. Fatigue							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Fatigue causes the crew to be less attentive and not notice obstructions such as wires and towers.	1. **Contractor** has fatigue management policies and management system to provide support to pilots and aircrew to avoid fatigue 2. **Contractor** has operating and effective SMS to ensure any fatigue events are captured and analysed to ensure effective remedies are put in place. 3. **Contractor** has a requirement that the aircraft lands about every 2 hours (except in normal transit) to allow pilot/aircrew time to have a reasonable break. 4. **Contractor** ensures that adequate drinking water is carried and accessible by pilot and aircrew inflight 5. **RFS Aviation Section** conducts investigations into occurrences where fatigue may be a contributing factor 6. **RFS Aviation Section** conducts audit/assessment of Contractor to ensure proper policies, procedures and systems are in place that addresses fatigue. 7. **NSW DPI** conducts audit/assessment to ensure proper DPI policies, procedures and systems are in place that addresses fatigue for its staff.	**1** **2** **3** **4** **5** **6** **7**	Fatigue is suspected in several occurrences where wire strikes have occurred but with management /administrative protocols identified consider the likelihood of fatigue as ***Unlikely***	The potential consequence due to chances of wire strike or flight into terrain causing fatality is ***Catastrophic***	**High**	No further controls are considered to be required based on the current risk profile			**High**

		4. Ground Impact							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Inadvertent ground impact made during low level operations being a significant safety hazard for the occupant/s	1. **Contractor** has fatigue management policies and system to provide support to pilots to avoid fatigue. 2. **Contractor** has operating SMS to ensure any fatigue events are captured and analysed to ensure effective remedies are put in place. 3. **Contractor** has appropriate publications and guidance in place to ensure pilots are provided with the knowledge to competently conduct low level (below 500ft) operations. 4. **Contractor** has a strong and effective checking and training system that ensures pilots are fully competent to conduct low level (<500ft) operations. 5. **RFS Aviation Section** specifies minimum experience levels in Standing Offer to help ensure pilot is competent to conduct operations. 6. **RFS Aviation Section** conducts investigations into occurrences to derive any organisational or human factor considerations and apply corrective actions as required. 7. **RFS Aviation Section** conducts audit/assessment of Contractor to ensure proper policies, procedures and systems are in place that addresses flying operations and management. 8. **Pilot and Contractor** history reviewed by RFS Aviation Section for any occurrences in the previous 5 years that indicate poor pilot decision making or poor aircraft handling.	**1** **2** **3** **4** **5** **6** **7** **8**	There have been 4 inadvertent ground impacts during similar types of operations in the last 5 years. Historical likelihood is assessed as *Likely* But with the current controls in place, assess the likelihood as ***Rare***	The consequence is assessed as ***Catastrophic*** due to result likely to be fatal	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium** **Note:** Control #8 to be implemented through Standing Offer requirements and auditing processes.

		5. Wire & Obstacle Strike							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Impact with wire or obstacle causes aircraft to impact ground in uncontrolled manner impinging on the safety of occupants	1. **Contractor** has published guidance to pilots on the avoidance of wire & obstacle strike. 2. **Contractor** trains pilots specifically in wire & obstacle avoidance including 'fly the wire' course or similar. 3. **Pilots** have specific training & experience for low level operations. 4. **RFS Aviation Section** specifies minimum experience & training levels in Standing Offer to help ensure pilot competent. 5. **Pilot** is to remain above 500ft AO unless descending to/departing from task, or landing/taking off. 6. **Contractor** has published procedures for descent and operations below 500ft AO. 7. **RFS Aviation Section** requires Contractor to prepare, where practical, hazard maps for operations below 500ft AO in the designated area. 8. **Pilot** obtains a brief from landowners & others about potential hazards, where practical. 9. **NSW DPI** requires, where possible, property owners provide a diagram or coordinates of the HLS or ALA including surrounding obstacles & wires to the LCC for the pilot. 10. **RFS Aviation Section** requires Contractor to have policies & procedures that require landings & take-offs should where possible be made at HLS & ALAs that conform to CAAP 92 more stringent requirements. 11. **NSW DPI** requires pilot to make vertical take-offs & landings as much as practical to avoid flying into unseen wires (must have sufficient power margins to do so) when operating from non-surveyed HLS. 12. NSW DPI operations only conducted during day VMC. 13. **RFS Aviation Section** requires helicopters to be equipped with Wire Strike Protection System if they can be so equipped. 14. **LAOM** briefing includes known hazards. 15. **RFA Aviation Section** conducts audit/assessments Contractor has proper systems and practices to avoid wire & obstacle strikes.	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13** **14** **15**	Historical likelihood is assessed as *Almost certain* The present controls are largely administrative controls which are the least effective controls in managing risk. However while they are the least effective, the number of controls presents a 'defence in depth' approach to the risk. With the present controls, likelihood is assessed as ***Unlikely***	ATSB records show most accidents result in fatalities. Consequence is assessed for the crew as ***Catastrophic***	**High**	All considered controls implemented			**High** **Note:** Control #13 to be implemented and checked through Standing Offer requirements and audit processes

		6. Inflight Emergency							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Pilot mishandles emergency or malfunction which leads to an accident	1. **Contractor** has adequate published guidance and training to pilots on the handling of malfunctions and emergencies. 2. **Pilots** have specific training and experience for operations (which includes the handling of malfunctions and emergencies at low level). 3. **Pilot** has suitable number of total hours, hours on type and recency flying. 4. **Contractor** to ensure suitable and adequate records of pilot training is kept. 5. **Pilot** history reviewed for any occurrences in the previous 5 years that indicate poor pilot decision-making or poor aircraft handling. 6. Operations generally conducted over areas that provide the pilot with emergency landing options. While this may not be totally true for operations over floodwaters, it provides for a relatively clear area to arrive. 7. **RFS Aviation Section** conducts audit/assessments to assure as far as practicably possible that Contractor has proper systems and practices to ensure pilot can handle emergencies. 8. **RFS Aviation Section** require pilot to have undergone Emergency check ride where possible within the month prior to commencing operations.	**1** **2** **3** **4** **5** **6** **7**	Pilot mishandling of emergencies do not appear to have been a causal factor in any helicopter accidents in the last 10 years. There has been at 2 fixed wing accidents from emergency handling in past 5 years. Reviewer is aware of non-reported occurrences. With the current controls, likelihood assessed as ***Unlikely***	Mishandling of an emergency could lead to the aircraft impacting the ground therefore assessed for the crew as ***Catastrophic***	**High**	**8** (ensure pilot is current in emergency training)	The additional control provides greater assurance that the pilot is current ***Rare***	Mishandling of an emergency could lead to the aircraft impacting the ground therefore for the crew, assessed as ***Catastrophic***	**Medium** **Note:** Controls will be implemented through Standing Offer requirements and audit process. NOTE Control #8 requires consultation with industry for practicality and cost effectiveness considerations (if not implemented residual risk remains high).

		7. Inflight Collision							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Mid-air collision between aircraft on similar task or with other aircraft (e.g. low flying military aircraft on published Low Jet Routes) impinges on safety of aircraft occupants.	1. **Contractor** installs radios to ensure pilot can communicate with other aircraft in the area. 2. **Contractor** installs TCAS to assist with potential collision identification and avoidance. 3. **Contractor** has training and checking systems and practices that ensure pilot is properly trained in communicating and identifying potential conflicting traffic. 4. **LAOM** briefing informs pilot of any potential traffic in the area where this traffic may be known or planned 5. **Pilot** checks maps, NOTAMs and/or briefing office for potential traffic 6. **Contractor** ensures aircraft **are** equipped with high-visibility markings 7. **Contractor** ensures aircraft have high-intensity strobes 8. **NSW DPI** has procedures in place that require a pre-arranged vertical separation between aircraft on same task. Also 'swap' procedures in place (swap height blocks with other aircraft if required). 9. **NSW DPI** and **Contractor** procedures require good visibility (in excess of 5nm) before tasking multiple aircraft onto the same task/area.	**1** **3** **4** **5** **6** **7**	Past occurrences indicate that without the appropriate controls, the likelihood should be assessed as *Likely* but with current controls, assessed as ***Rare*** There is an increased risk when there are two or more aircraft operating in the same area on the same task. In this case, the current controls assessed to ***Likely***	Consequence of a mid-air is usually ***Catastrophic***	**Medium** (when tasked alone) **High to Extreme** (when operating with other aircraft)	Control **2** could be effective depending on how close the aircraft were operating to each other. **8** (Vertical separation and 'swap' procedures to account for loss of sight of other aircraft) **9** (provides a measure of probability that pilots may see each other's aircraft especially noting radio requirements)	***Rare***	***Catastrophic***	**Medium** **Note:** Controls implemented through Standing Offer requirements and auditing processes. Control #2 may not be practical to implement as would require all aircraft to operate with transponders which may not be practical or cost effective. Also aircraft operating close to each other may result in many false warnings making the system less effective. Controls 8 & 9 to be implemented through NSW DPI procedures.

		8.	Power Margin						
Failure to ensure adequate power margins leads to loss of control and impinges on the safety of the aircraft occupants.	1. **RFS Aviation Section** requires Contractor to have policies, procedures and guidance requires that pilots assess power margin availability inflight. 2. **RFS Aviation Section** requires Contractor to have properly operating training and checking system in place that checks that power margins are being applied in helicopters and performance assurance in fixed wing aircraft. 3. **RFS Aviation Section** details minimum helicopter power margin requirement in Standing Offer. 4. **RFS Aviation Section** conducts audit/assessments to assure as far as practicably possible that Contractor has proper systems and practices in place to ensure pilots operate with appropriate power margins.	**1** **2** **3** **4**	Records indicate that the likelihood is *Likely* but with controls in place, assessed as ***Rare***	Consequence is assessed as ***Catastrophic*** due to potentially fatal injuries for crew	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium**

		9.	Landing						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
Landing at non-surveyed areas poses a risk due to size or obstructions	1. **RFS Aviation Section** requires **Contractor** to operate wherever possible to areas that comply with CAAP 92-2 more stringent limitations. 2. **RFS Aviation Section** requires **Contractor** to have published procedures that include reconnaissance requirements before making approach to HLS or ALA. 3. **LAOM** provides any known information about HLS or ALA in briefing. 4. **RFS Aviation Section** requires **Contractor** to have procedures that ensure the aircraft have adequate power margins and performance before arriving on task. 5. **NSW DPI** requires helicopter landings to be vertical from a safe height into un-surveyed HLSs to ensure clearance from unseen obstructions and wires on the approach to previously un-surveyed HLSs. 6. **RFS Aviation Section** requires **Contractor** to have an effective SMS to capture any issues or occurrences and to manage risk.	**1** **2** **3** **4** **5** **6**	Historical data indicates likelihood as *Possible* With the current controls, likelihood assessed as ***Unlikely***	Due to high chance of fatality, consequence assessed as ***Catastrophic***	**High**	All considered controls implemented			**Medium** **Note:** Controls to be implemented and checked through Standing Offer requirements and audit processes

		10. Fixed Wing Transport							
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
a. Operating the aircraft out of trim or overloaded leading to pilot losing control of the aircraft resulting in an accident.	1. **Contractor** has appropriate publications and guidance in place to ensure pilots are provided with the knowledge to competently calculate aircraft trim and weight and loading system. 2. **Contractor** has cockpit check systems available to pilot to quickly determine aircraft trim and weight**.** 3. **Contractor** has training and checking system that ensures pilots know the procedures associated with trimming and loading aircraft. 4. **RFS Aviation Section** checks **Contractor** to ensure appropriate publications available and pilots trained and checked to operate aircraft within published limits**.**	**1** **3** **4**	ATSB reports have not indicated poor pre-flight or starting procedures as a contributor to occurrences in the past 15 years. Assessed as ***Rare***	Loss of control in flight may result in a fatal accident ***Catastrophic***	**Medium**	**2** to ensure pilot has ready access to information to ascertain trim and weight of aircraft	***Rare***	***Catastrophic***	**Medium**
b. Visual flight conditions lost leading to aircraft loss of control or terrain impact.	1. **Pilot** has valid and current instrument rating. 2. **Contractor** has appropriate publications and guidance in place to ensure pilots are provided with the knowledge to competently operate the aircraft under Instrument Flight Rules (IFR). 3. **Contractor** equips and certifies the aircraft to operate under IFR. 4. **Contractor** has training and checking system that ensures pilots know the procedures associated with operating the aircraft under IFR. 5. **NSW DPI** requires the aircraft to be operated in visual conditions only in which case, the **Contractor** has the appropriate publications, training and checking systems in place**.** 6. **RFS Aviation Section** checks **Contractor** to ensure appropriate publications available, pilots trained and checked to operate aircraft and aircraft suitable for operations under IFR or Visual Flight Rules depending on the requirement. 7. **RFS Aviation Section** requires **Contractor** to have an instrument recovery procedure and training & checking system to permit pilot to retain control of aircraft and recover to visual conditions.	**5** **6**	ATSB records show that inadvertent entry into instrument conditions that cause an accident has occurred once in the last 5 years which indicates likelihood without controls as *Likely*. With controls in place, assessed as **Possible**	Loss of control in flight or controlled flight into terrain could result in fatal accident ***Catastrophic***	**High**	**7** To help ensure pilot could recover the aircraft from inadvertent entry to instrument conditions.	***Unlikely***	***Catastrophic***	**High** **Note:** 1,2, 3 & 4 would almost eliminate risk but cost may prove prohibitive

			11. Helicopter Transport							
Risk	**Possible Controls**		**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
a. Improper load lifting techniques lead to accident.	**1. Pilot** has appropriate endorsement for load lift operations. **2. Contractor** has appropriate publications and guidance in place to ensure pilots have access to the knowledge to competently conduct load-lifting operations - includes specification of power margins & emergency procedures. **3. Contractor** has inspection and maintenance schedule, & proper stowage for lift equip**.** **4. Contractor** provides suitable aircraft to conduct load lifting. **5. Contractor** has training & checking system to ensure pilots know load lift procedures. **6. RFS Aviation Section** checks **Contractor** to ensure appropriate publications available, pilots trained and checked to operate aircraft and aircraft suitable for load lift operations.		**1 2 3 4 5 6**	ATSB records show that there have been no accidents associated with load lifting in the past 10 years, which indicates likelihood without controls as ***Rare***	Loss of control in flight or impact by an unstable load could result in fatal accident ***Catastrophic***	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium**
b. Improper conduct of winching operations leads to an accident	**1. Pilot** has appropriate endorsement for winch operations. **2. Helicopter** is twin engine with minimum Class 2 performance for all operations**.** **3. Contractor** has appropriate publications and guidance to ensure pilots & winch Contractors have access to the knowledge to competently conduct winch operations. This includes specification of power margins and emergency procedures. Uses RFS Winch Standards as a basis for procedures. **4. Contractor** has inspection and maintenance schedule, & proper stowage for winch equipment**.** **5. Contractor** uses appropriate aircraft to conduct winch operations. Winch meets full certification standards. **6. Contractor** has training & checking system to ensure pilots & winch Contractors know the load lift procedures. **7. RFS Aviation Section** checks **Contractor** to ensure appropriate publications available, pilots & winch Contractors are trained and checked to operate aircraft and aircraft suitable for winch operations.		**1 2 3 4 5 6 7**	ATSB records show that there have been no accidents associated with winch operations in the past 10 years, which indicates likelihood without controls as ***Rare***	An event with someone on the hoist could result in fatal accident ***Catastrophic***	**Medium**	No further controls are considered to be required based on the current risk profile			**Medium**

G. Accident Considerations:
The risk assessment identifies the considerations, risks, and controls in the event of an accident.
The quick notification, location and recovery of personnel involved in an accident is essential for survival.

G.	**ACCIDENT**	**1.**	**Survival**						
Risk	**Possible Controls**	**Current Control**	**Likelihood**	**Consequence**	**Current Risk**	**Proposed Controls**	**Revised Likelihood**	**Revised Consequence**	**Residual Risk**
If an accident occurs, survival of the occupants depends on having appropriate equipment and rapid recovery	1. **RFS Aviation Section** requires **Contractor** to carry a survival kit in its aircraft. **2. RFS Aviation Section** requires **Contractor** to carry medical kits in the aircraft. **3. RFS Aviation Section** ensures that flight following is conducted to help assure rapid recovery. **4. RFS Aviation Section** requires **Contractor** to equip aircraft with tracking equipment to ensure aircraft whereabouts known at all times. **5. RFS Aviation Section** requires **Contractor** to have an effective SMS to capture any issues or occurrences and to manage risk. 6. **RFS Aviation Section** requires carriage of ELB by pilot.	**1** **2** **3** **4** **5** **6**	There have been at least 5 accidents in the last 10 years where the location of aircraft following an accident was not quickly known. Likelihood based on data is *Possible* With the current controls, assess the likelihood as ***Rare***	Failure to quickly find survivors may lead to ***Catastrophic*** results for the crew	**Medium**	All considered controls implemented			**Medium**

Approval	**Roles**	**Date**
Risk assessment prepared by:	Emergency Management Officer Aviation Consultant	13 January 2022
Risk assessment approved by:	Manager Emergency Operations	19 January 2022